SEQUENCE LISTING

<110> Imperial College Innovations Limited

<120> Control of Gene Expression

<130> ICOY/P23098US

<160> 11

<170> PatentIn version 3.1

<210> 1
<211> 35
<212> DNA
<213> Artificial

<220>
<223> Primer PLZF R

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35

<210> 2
<211> 30
<212> DNA
<213> Artificial

<220>
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<400> 2
ccgctcgagg gccaaattca gataatcgac
30

<210> 3
<211> 25
<212> DNA
<213> Artificial

<220>
<223> Primer ER R1

<400> 3

ccgtgtggga tccagggagc tctca
25

<210> 4
<211> 31
<212> DNA
<213> Artificial

<220>
<223> Primer AR F1

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ggagctcgag ggttggagac tgccagggac c
31

<210> 5
<211> 33
<212> DNA
<213> Artificial

<220>
<223> Primer AR R1

<400> 5
gtgaggatcc tcactgggtg tggaaataga tgg
33

<210> 6
<211> 482
<212> PRT
<213> Homo sapiens

<400> 6

Met Ala Gln Thr Gln Gly Thr Arg Arg Lys Val Cys Tyr Tyr Tyr Asp
1 5 10 15

Gly Asp Val Gly Asn Tyr Tyr Tyr Gly Gln Gly His Pro Met Lys Pro
20 25 30

His Arg Ile Arg Met Thr His Asn Leu Leu Leu Asn Tyr Gly Leu Tyr
35 40 45

Arg Lys Met Glu Ile Tyr Arg Pro His Lys Ala Asn Ala Glu Glu Met
50 55 60

Thr Lys Tyr His Ser Asp Asp Tyr Ile Lys Phe Leu Arg Ser Ile Arg
65 70 75 80

Pro Asp Asn Met Ser Glu Tyr Ser Lys Gln Met Gln Arg Phe Asn Val
85 90 95

Gly Glu Asp Cys Pro Val Phe Asp Gly Leu Phe Glu Phe Cys Gln Leu
100 105 110

Ser Thr Gly Gly Ser Val Ala Ser Ala Val Lys Leu Asn Lys Gln Gln
115 120 125

Thr Asp Ile Ala Val Asn Trp Ala Gly Gly Leu His His Ala Lys Lys
130 135 140

Ser Glu Ala Ser Gly Phe Cys Tyr Val Asn Asp Ile Val Leu Ala Ile
145 150 155 160

Leu Glu Leu Leu Lys Tyr His Gln Arg Val Leu Tyr Ile Asp Ile Asp
165 170 175

Ile His His Gly Asp Gly Val Glu Glu Ala Phe Tyr Thr Thr Asp Arg
180 185 190

Val Met Thr Val Ser Phe His Lys Tyr Gly Glu Tyr Phe Pro Gly Thr
195 200 205

Gly Asp Leu Arg Asp Ile Gly Ala Gly Lys Gly Lys Tyr Tyr Ala Val
210 215 220

Asn Tyr Pro Leu Arg Asp Gly Ile Asp Asp Glu Ser Tyr Glu Ala Ile
225 230 235 240

```
Phe Lys Pro Val Met Ser Lys Val Met Glu Met Phe Gln Pro Ser Ala
                245                 250                 255

Val Val Leu Gln Cys Gly Ser Asp Ser Leu Ser Gly Asp Arg Leu Gly
            260                 265                 270

Cys Phe Asn Leu Thr Ile Lys Gly His Ala Lys Cys Val Glu Phe Val
        275                 280                 285

Lys Ser Phe Asn Leu Pro Met Leu Met Leu Gly Gly Gly Gly Tyr Thr
    290                 295                 300

Ile Arg Asn Val Ala Arg Cys Trp Thr Tyr Glu Thr Ala Val Ala Leu
305                 310                 315                 320

Asp Thr Glu Ile Pro Asn Glu Leu Pro Tyr Asn Asp Tyr Phe Glu Tyr
                325                 330                 335

Phe Gly Pro Asp Phe Lys Leu His Ile Ser Pro Ser Asn Met Thr Asn
            340                 345                 350

Gln Asn Thr Asn Glu Tyr Leu Glu Lys Ile Lys Gln Arg Leu Phe Glu
        355                 360                 365

Asn Leu Arg Met Leu Pro His Ala Pro Gly Val Gln Met Gln Ala Ile
    370                 375                 380

Pro Glu Asp Ala Ile Pro Glu Glu Ser Gly Asp Glu Asp Glu Asp Asp
385                 390                 395                 400

Pro Asp Lys Arg Ile Ser Ile Cys Ser Ser Asp Lys Arg Ile Ala Cys
                405                 410                 415

Glu Glu Glu Phe Ser Asp Ser Glu Glu Glu Gly Glu Gly Gly Arg Lys
            420                 425                 430
```

Asn Ser Ser Asn Phe Lys Lys Ala Lys Arg Val Lys Thr Glu Asp Glu
435 440 445

Lys Glu Lys Asp Pro Glu Glu Lys Lys Glu Val Thr Glu Glu Glu Lys
450 455 460

Thr Lys Glu Glu Lys Pro Glu Ala Lys Gly Val Lys Glu Glu Val Lys
465 470 475 480

Leu Ala

<210> 7
<211> 501
<212> PRT
<213> Arabidopsis thaliana

<400> 7

Met Asp Thr Gly Gly Asn Ser Leu Ala Ser Gly Pro Asp Gly Val Lys
1 5 10 15

Arg Lys Val Cys Tyr Phe Tyr Asp Pro Glu Val Gly Asn Tyr Tyr Tyr
20 25 30

Gly Gln Gly His Pro Met Lys Pro His Arg Ile Arg Met Thr His Ala
35 40 45

Leu Leu Ala His Tyr Gly Leu Leu Gln His Met Gln Val Leu Lys Pro
50 55 60

Phe Pro Ala Arg Asp Arg Asp Leu Cys Arg Phe His Ala Asp Asp Tyr
65 70 75 80

Val Ser Phe Leu Arg Ser Ile Thr Pro Glu Thr Gln Gln Asp Gln Ile
85 90 95

```
Arg Gln Leu Lys Arg Phe Asn Val Gly Glu Asp Cys Pro Val Phe Asp
            100                 105                 110

Gly Leu Tyr Ser Phe Cys Gln Thr Tyr Ala Gly Gly Ser Val Gly Gly
        115                 120                 125

Ser Val Lys Leu Asn His Gly Leu Cys Asp Ile Ala Ile Asn Trp Ala
    130                 135                 140

Gly Gly Leu His His Ala Lys Lys Cys Glu Ala Ser Gly Phe Cys Tyr
145                 150                 155                 160

Val Asn Asp Ile Val Leu Ala Ile Leu Glu Leu Leu Lys Gln His Glu
                165                 170                 175

Arg Val Leu Tyr Val Asp Ile Asp Ile His His Gly Asp Gly Val Glu
            180                 185                 190

Glu Ala Phe Tyr Ala Thr Asp Arg Val Met Thr Val Ser Phe His Lys
        195                 200                 205

Phe Gly Asp Tyr Phe Pro Gly Thr Gly His Ile Gln Asp Ile Gly Tyr
    210                 215                 220

Gly Ser Gly Lys Tyr Tyr Ser Leu Asn Val Pro Leu Asp Asp Gly Ile
225                 230                 235                 240

Asp Asp Glu Ser Tyr His Leu Leu Phe Lys Pro Ile Met Gly Lys Val
                245                 250                 255

Met Glu Ile Phe Arg Pro Gly Ala Val Val Leu Gln Cys Gly Ala Asp
            260                 265                 270

Ser Leu Ser Gly Asp Arg Leu Gly Cys Phe Asn Leu Ser Ile Lys Gly
        275                 280                 285
```

```
His Ala Glu Cys Val Lys Phe Met Arg Ser Phe Asn Val Pro Leu Leu
    290                 295                 300

Leu Leu Gly Gly Gly Gly Tyr Thr Ile Arg Asn Val Ala Arg Cys Trp
305                 310                 315                 320

Cys Tyr Glu Thr Gly Val Ala Leu Gly Val Glu Val Glu Asp Lys Met
                325                 330                 335

Pro Glu His Glu Tyr Tyr Glu Tyr Phe Gly Pro Asp Tyr Thr Leu His
            340                 345                 350

Val Ala Pro Ser Asn Met Glu Asn Lys Asn Ser Arg Gln Met Leu Glu
        355                 360                 365

Glu Ile Arg Asn Asp Leu Leu His Asn Leu Ser Lys Leu Gln His Ala
    370                 375                 380

Pro Ser Val Pro Phe Gln Glu Arg Pro Pro Asp Thr Glu Thr Pro Glu
385                 390                 395                 400

Val Asp Glu Asp Gln Glu Asp Gly Asp Lys Arg Trp Asp Pro Asp Ser
                405                 410                 415

Asp Met Asp Val Asp Asp Asp Arg Lys Pro Ile Pro Ser Arg Val Lys
            420                 425                 430

Arg Glu Ala Val Glu Pro Asp Thr Lys Asp Lys Asp Gly Leu Lys Gly
        435                 440                 445

Ile Met Glu Arg Gly Lys Gly Cys Glu Val Glu Val Asp Glu Ser Gly
    450                 455                 460

Ser Thr Lys Val Thr Gly Val Asn Pro Val Gly Val Glu Glu Ala Ser
465                 470                 475                 480
```

Val Lys Met Glu Glu Glu Gly Thr Asn Lys Gly Gly Ala Glu Gln Ala
485 490 495

Phe Pro Pro Lys Thr
500

<210> 8
<211> 433
<212> PRT
<213> Saccharomyces cerevisiae

<400> 8

Met Val Tyr Glu Ala Thr Pro Phe Asp Pro Ile Thr Val Lys Pro Ser
1 5 10 15

Asp Lys Arg Arg Val Ala Tyr Phe Tyr Asp Ala Asp Val Gly Asn Tyr
20 25 30

Ala Tyr Gly Ala Gly His Pro Met Lys Pro His Arg Ile Arg Met Ala
35 40 45

His Ser Leu Ile Met Asn Tyr Gly Leu Tyr Lys Lys Met Glu Ile Tyr
50 55 60

Arg Ala Lys Pro Ala Thr Lys Gln Glu Met Cys Gln Phe His Thr Asp
65 70 75 80

Glu Tyr Ile Asp Phe Leu Ser Arg Val Thr Pro Asp Asn Leu Glu Met
85 90 95

Phe Lys Arg Glu Ser Val Lys Phe Asn Val Gly Asp Asp Cys Pro Val
100 105 110

Phe Asp Gly Leu Tyr Glu Tyr Cys Ser Ile Ser Gly Gly Gly Ser Met
115 120 125

Glu Gly Ala Ala Arg Leu Asn Arg Gly Lys Cys Asp Val Ala Val Asn

130 135 140

Tyr Ala Gly Gly Leu His His Ala Lys Lys Ser Glu Ala Ser Gly Phe
145 150 155 160

Cys Tyr Leu Asn Asp Ile Val Leu Gly Ile Ile Glu Leu Leu Arg Tyr
165 170 175

His Pro Arg Val Leu Tyr Ile Asp Ile Asp Val His His Gly Asp Gly
180 185 190

Val Glu Glu Ala Phe Tyr Thr Thr Asp Arg Val Met Thr Cys Ser Phe
195 200 205

His Lys Tyr Gly Glu Phe Phe Pro Gly Thr Gly Glu Leu Arg Asp Ile
210 215 220

Gly Val Gly Ala Gly Lys Asn Tyr Ala Val Asn Val Pro Leu Arg Asp
225 230 235 240

Gly Ile Asp Asp Ala Thr Tyr Arg Ser Val Phe Glu Pro Val Ile Lys
245 250 255

Lys Ile Met Glu Trp Tyr Gln Pro Ser Ala Val Val Leu Gln Cys Gly
260 265 270

Gly Asp Ser Leu Ser Gly Asp Arg Leu Gly Cys Phe Asn Leu Ser Met
275 280 285

Glu Gly His Ala Asn Cys Val Asn Tyr Val Lys Ser Phe Gly Ile Pro
290 295 300

Met Met Val Val Gly Gly Gly Gly Tyr Thr Met Arg Asn Val Ala Arg
305 310 315 320

Thr Trp Cys Phe Glu Thr Gly Leu Leu Asn Asn Val Val Leu Asp Lys

325 330 335

Asp Leu Pro Tyr Asn Glu Tyr Tyr Glu Tyr Tyr Gly Pro Asp Tyr Lys
340 345 350

Leu Ser Val Arg Pro Ser Asn Met Phe Asn Val Asn Thr Pro Glu Tyr
355 360 365

Leu Asp Lys Val Met Thr Asn Ile Phe Ala Asn Leu Glu Asn Thr Lys
370 375 380

Tyr Ala Pro Ser Val Gln Leu Asn His Thr Pro Arg Asp Ala Glu Asp
385 390 395 400

Leu Gly Asp Val Glu Glu Asp Ser Ala Glu Ala Lys Asp Thr Lys Gly
405 410 415

Gly Ser Gln Tyr Ala Arg Asp Leu His Val Glu His Asp Asn Glu Phe
420 425 430

Tyr

<210> 9
<211> 900
<212> PRT
<213> Artificial

<220>
<223> Fusion protein PLZF-ER

<400> 9

Met Asp Leu Thr Lys Met Gly Met Ile Gln Leu Gln Asn Pro Ser His
1 5 10 15

Pro Thr Gly Leu Leu Cys Lys Ala Asn Gln Met Arg Leu Ala Gly Thr
20 25 30

Leu Cys Asp Val Val Ile Met Val Asp Ser Gln Glu Phe His Ala His
35 40 45

Arg Thr Val Leu Ala Cys Thr Ser Lys Met Phe Glu Ile Leu Phe His
50 55 60

Arg Asn Ser Gln His Tyr Thr Leu Asp Phe Leu Ser Pro Lys Thr Phe
65 70 75 80

Gln Gln Ile Leu Glu Tyr Ala Tyr Thr Ala Thr Leu Gln Ala Lys Ala
85 90 95

Glu Asp Leu Asp Asp Leu Leu Tyr Ala Ala Glu Ile Leu Glu Ile Glu
100 105 110

Tyr Leu Glu Glu Gln Cys Leu Lys Met Leu Glu Thr Ile Gln Ala Ser
115 120 125

Asp Asp Asn Asp Thr Glu Ala Thr Met Ala Asp Gly Gly Ala Glu Glu
130 135 140

Glu Glu Asp Arg Lys Ala Arg Tyr Leu Lys Asn Ile Phe Ile Ser Lys
145 150 155 160

His Ser Ser Glu Glu Ser Gly Tyr Ala Ser Val Ala Gly Gln Ser Leu
165 170 175

Pro Gly Pro Met Val Asp Gln Ser Pro Ser Val Ser Thr Ser Phe Gly
180 185 190

Leu Ser Ala Met Ser Pro Thr Lys Ala Ala Val Asp Ser Leu Met Thr
195 200 205

Ile Gly Gln Ser Leu Leu Gln Gly Thr Leu Gln Pro Pro Ala Gly Pro
210 215 220

```
Glu Glu Pro Thr Leu Ala Gly Gly Gly Arg His Pro Gly Val Ala Glu
225                 230                 235                 240

Val Lys Thr Glu Met Met Gln Val Asp Glu Val Pro Ser Gln Asp Ser
                245                 250                 255

Pro Gly Ala Ala Glu Ser Ser Ile Ser Gly Gly Met Gly Asp Lys Val
            260                 265                 270

Glu Glu Arg Gly Lys Glu Gly Pro Gly Thr Pro Thr Arg Ser Ser Val
        275                 280                 285

Ile Thr Ser Ala Arg Glu Leu His Tyr Gly Arg Glu Glu Ser Ala Glu
    290                 295                 300

Gln Val Pro Pro Pro Ala Glu Ala Gly Gln Ala Pro Thr Gly Arg Pro
305                 310                 315                 320

Glu His Pro Ala Pro Pro Pro Glu Lys His Leu Gly Ile Tyr Ser Val
                325                 330                 335

Leu Pro Asn His Lys Ala Asp Ala Val Leu Ser Met Pro Ser Ser Val
            340                 345                 350

Thr Ser Gly Leu His Val Gln Pro Ala Leu Ala Val Ser Met Asp Phe
        355                 360                 365

Ser Thr Tyr Gly Gly Leu Leu Pro Gln Gly Phe Ile Gln Arg Glu Leu
    370                 375                 380

Phe Ser Lys Leu Gly Glu Leu Ala Val Gly Met Lys Ser Glu Ser Arg
385                 390                 395                 400

Thr Ile Gly Glu Gln Cys Ser Val Cys Gly Val Glu Leu Pro Asp Asn
                405                 410                 415
```

```
Glu Ala Val Glu Gln His Arg Lys Leu His Ser Gly Met Lys Thr Tyr
            420                 425                 430

Gly Cys Glu Leu Cys Gly Lys Arg Phe Leu Asp Ser Leu Arg Leu Arg
        435                 440                 445

Met His Leu Leu Ala His Ser Arg Pro Asn Ser Asp Asn Arg Arg Gln
    450                 455                 460

Gly Gly Arg Glu Arg Leu Ala Ser Thr Asn Asp Lys Gly Ser Met Ala
465                 470                 475                 480

Met Glu Ser Ala Lys Glu Thr Arg Tyr Cys Ala Val Cys Asn Asp Tyr
                485                 490                 495

Ala Ser Gly Tyr His Tyr Gly Val Trp Ser Cys Glu Gly Cys Lys Ala
            500                 505                 510

Phe Phe Lys Arg Ser Ile Gln Gly His Asn Asp Tyr Met Cys Pro Ala
        515                 520                 525

Thr Asn Gln Cys Thr Ile Asp Lys Asn Arg Arg Lys Ser Cys Gln Ala
    530                 535                 540

Cys Arg Leu Arg Lys Cys Tyr Glu Val Gly Met Met Lys Gly Gly Ile
545                 550                 555                 560

Arg Lys Asp Arg Arg Gly Gly Arg Met Leu Lys His Lys Arg Gln Arg
                565                 570                 575

Asp Asp Gly Glu Gly Arg Gly Glu Val Gly Ser Ala Gly Asp Met Arg
            580                 585                 590

Ala Ala Asn Leu Trp Pro Ser Pro Leu Met Ile Lys Arg Ser Lys Lys
        595                 600                 605
```

```
Asn Ser Leu Ala Leu Ser Leu Thr Ala Asp Gln Met Val Ser Ala Leu
    610                 615                 620

Leu Asp Ala Glu Pro Pro Ile Leu Tyr Ser Glu Tyr Asp Pro Thr Arg
625                 630                 635                 640

Pro Phe Ser Glu Ala Ser Met Met Gly Leu Leu Thr Asn Leu Ala Asp
                645                 650                 655

Arg Glu Leu Val His Met Ile Asn Trp Ala Lys Arg Val Pro Gly Phe
            660                 665                 670

Val Asp Leu Thr Leu His Asp Gln Val His Leu Leu Glu Cys Ala Trp
        675                 680                 685

Leu Glu Ile Leu Met Ile Gly Leu Val Trp Arg Ser Met Glu His Pro
    690                 695                 700

Val Lys Leu Leu Phe Ala Pro Asn Leu Leu Leu Asp Arg Asn Gln Gly
705                 710                 715                 720

Lys Cys Val Glu Gly Met Val Glu Ile Phe Asp Met Leu Leu Ala Thr
                725                 730                 735

Ser Ser Arg Phe Arg Met Met Asn Leu Gln Gly Glu Glu Phe Val Cys
            740                 745                 750

Leu Lys Ser Ile Ile Leu Leu Asn Ser Gly Val Tyr Thr Phe Leu Ser
        755                 760                 765

Ser Thr Leu Lys Ser Leu Glu Glu Lys Asp His Ile His Arg Val Leu
    770                 775                 780

Asp Lys Ile Thr Asp Thr Leu Ile His Leu Met Ala Lys Ala Gly Leu
785                 790                 795                 800
```

Thr Leu Gln Gln Gln His Gln Arg Leu Ala Gln Leu Leu Leu Ile Leu
805 810 815

Ser His Ile Arg His Met Ser Asn Lys Gly Met Glu His Leu Tyr Ser
820 825 830

Met Lys Cys Lys Asn Val Val Pro Leu Tyr Asp Leu Leu Leu Glu Met
835 840 845

Leu Asp Ala His Arg Leu His Ala Pro Thr Ser Arg Gly Gly Ala Ser
850 855 860

Val Glu Glu Thr Asp Gln Ser His Leu Ala Thr Ala Gly Ser Thr Ser
865 870 875 880

Ser His Ser Leu Gln Lys Tyr Tyr Ile Thr Gly Glu Ala Glu Gly Phe
885 890 895

Pro Ala Thr Val
900

<210> 10
<211> 416
<212> PRT
<213> Artificial

<220>
<223> Amino acids 180 to 595 of human ERalpha

<400> 10

Lys Glu Thr Arg Tyr Cys Ala Val Cys Asn Asp Tyr Ala Ser Gly Tyr
1 5 10 15

His Tyr Gly Val Trp Ser Cys Glu Gly Cys Lys Ala Phe Phe Lys Arg
20 25 30

Ser Ile Gln Gly His Asn Asp Tyr Met Cys Pro Ala Thr Asn Gln Cys

35 40 45

Thr Ile Asp Lys Asn Arg Arg Lys Ser Cys Gln Ala Cys Arg Leu Arg
50 55 60

Lys Cys Tyr Glu Val Gly Met Met Lys Gly Gly Ile Arg Lys Asp Arg
65 70 75 80

Arg Gly Gly Arg Met Leu Lys His Lys Arg Gln Arg Asp Asp Gly Glu
85 90 95

Gly Arg Gly Glu Val Gly Ser Ala Gly Asp Met Arg Ala Ala Asn Leu
100 105 110

Trp Pro Ser Pro Leu Met Ile Lys Arg Ser Lys Lys Asn Ser Leu Ala
115 120 125

Leu Ser Leu Thr Ala Asp Gln Met Val Ser Ala Leu Leu Asp Ala Glu
130 135 140

Pro Pro Ile Leu Tyr Ser Glu Tyr Asp Pro Thr Arg Pro Phe Ser Glu
145 150 155 160

Ala Ser Met Met Gly Leu Leu Thr Asn Leu Ala Asp Arg Glu Leu Val
165 170 175

His Met Ile Asn Trp Ala Lys Arg Val Pro Gly Phe Val Asp Leu Thr
180 185 190

Leu His Asp Gln Val His Leu Leu Glu Cys Ala Trp Leu Glu Ile Leu
195 200 205

Met Ile Gly Leu Val Trp Arg Ser Met Glu His Pro Val Lys Leu Leu
210 215 220

Phe Ala Pro Asn Leu Leu Leu Asp Arg Asn Gln Gly Lys Cys Val Glu

225 230 235 240

Gly Met Val Glu Ile Phe Asp Met Leu Leu Ala Thr Ser Ser Arg Phe
245 250 255

Arg Met Met Asn Leu Gln Gly Glu Glu Phe Val Cys Leu Lys Ser Ile
260 265 270

Ile Leu Leu Asn Ser Gly Val Tyr Thr Phe Leu Ser Ser Thr Leu Lys
275 280 285

Ser Leu Glu Glu Lys Asp His Ile His Arg Val Leu Asp Lys Ile Thr
290 295 300

Asp Thr Leu Ile His Leu Met Ala Lys Ala Gly Leu Thr Leu Gln Gln
305 310 315 320

Gln His Gln Arg Leu Ala Gln Leu Leu Leu Ile Leu Ser His Ile Arg
325 330 335

His Met Ser Asn Lys Gly Met Glu His Leu Tyr Ser Met Lys Cys Lys
340 345 350

Asn Val Val Pro Leu Tyr Asp Leu Leu Leu Glu Met Leu Asp Ala His
355 360 365

Arg Leu His Ala Pro Thr Ser Arg Gly Gly Ala Ser Val Glu Glu Thr
370 375 380

Asp Gln Ser His Leu Ala Thr Ala Gly Ser Thr Ser Ser His Ser Leu
385 390 395 400

Gln Lys Tyr Tyr Ile Thr Gly Glu Ala Glu Gly Phe Pro Ala Thr Val
405 410 415

<210> 11

<211> 836
<212> PRT
<213> Artificial

<220>
<223> Fusion between PLZF and AR

<400> 11

Met Asp Leu Thr Lys Met Gly Met Ile Gln Leu Gln Asn Pro Ser His
1 5 10 15

Pro Thr Gly Leu Leu Cys Lys Ala Asn Gln Met Arg Leu Ala Gly Thr
20 25 30

Leu Cys Asp Val Val Ile Met Val Asp Ser Gln Glu Phe His Ala His
35 40 45

Arg Thr Val Leu Ala Cys Thr Ser Lys Met Phe Glu Ile Leu Phe His
50 55 60

Arg Asn Ser Gln His Tyr Thr Leu Asp Phe Leu Ser Pro Lys Thr Phe
65 70 75 80

Gln Gln Ile Leu Glu Tyr Ala Tyr Thr Ala Thr Leu Gln Ala Lys Ala
85 90 95

Glu Asp Leu Asp Asp Leu Leu Tyr Ala Ala Glu Ile Leu Glu Ile Glu
100 105 110

Tyr Leu Glu Glu Gln Cys Leu Lys Met Leu Glu Thr Ile Gln Ala Ser
115 120 125

Asp Asp Asn Asp Thr Glu Ala Thr Met Ala Asp Gly Gly Ala Glu Glu
130 135 140

Glu Glu Asp Arg Lys Ala Arg Tyr Leu Lys Asn Ile Phe Ile Ser Lys
145 150 155 160

```
His Ser Ser Glu Glu Ser Gly Tyr Ala Ser Val Ala Gly Gln Ser Leu
                165                 170                 175

Pro Gly Pro Met Val Asp Gln Ser Pro Ser Val Ser Thr Ser Phe Gly
            180                 185                 190

Leu Ser Ala Met Ser Pro Thr Lys Ala Ala Val Asp Ser Leu Met Thr
        195                 200                 205

Ile Gly Gln Ser Leu Leu Gln Gly Thr Leu Gln Pro Pro Ala Gly Pro
    210                 215                 220

Glu Glu Pro Thr Leu Ala Gly Gly Gly Arg His Pro Gly Val Ala Glu
225                 230                 235                 240

Val Lys Thr Glu Met Met Gln Val Asp Glu Val Pro Ser Gln Asp Ser
                245                 250                 255

Pro Gly Ala Ala Glu Ser Ser Ile Ser Gly Gly Met Gly Asp Lys Val
            260                 265                 270

Glu Glu Arg Gly Lys Glu Gly Pro Gly Thr Pro Thr Arg Ser Ser Val
        275                 280                 285

Ile Thr Ser Ala Arg Glu Leu His Tyr Gly Arg Glu Glu Ser Ala Glu
    290                 295                 300

Gln Val Pro Pro Pro Ala Glu Ala Gly Gln Ala Pro Thr Gly Arg Pro
305                 310                 315                 320

Glu His Pro Ala Pro Pro Pro Glu Lys His Leu Gly Ile Tyr Ser Val
                325                 330                 335

Leu Pro Asn His Lys Ala Asp Ala Val Leu Ser Met Pro Ser Ser Val
            340                 345                 350
```

Thr Ser Gly Leu His Val Gln Pro Ala Leu Ala Val Ser Met Asp Phe
355 360 365

Ser Thr Tyr Gly Gly Leu Leu Pro Gln Gly Phe Ile Gln Arg Glu Leu
370 375 380

Phe Ser Lys Leu Gly Glu Leu Ala Val Gly Met Lys Ser Glu Ser Arg
385 390 395 400

Thr Ile Gly Glu Gln Cys Ser Val Cys Gly Val Glu Leu Pro Asp Asn
405 410 415

Glu Ala Val Glu Gln His Arg Lys Leu His Ser Gly Met Lys Thr Tyr
420 425 430

Gly Cys Glu Leu Cys Gly Lys Arg Phe Leu Asp Ser Leu Arg Leu Arg
435 440 445

Met His Leu Leu Ala His Ser Asp Met Arg Leu Glu Thr Ala Arg Asp
450 455 460

His Val Leu Pro Ile Asp Tyr Tyr Phe Pro Pro Gln Lys Thr Cys Leu
465 470 475 480

Ile Cys Gly Asp Glu Ala Ser Gly Cys His Tyr Gly Ala Leu Thr Cys
485 490 495

Gly Ser Cys Lys Val Phe Phe Lys Arg Ala Ala Glu Gly Lys Gln Lys
500 505 510

Tyr Leu Cys Ala Ser Arg Asn Asp Cys Thr Ile Asp Lys Phe Arg Arg
515 520 525

Lys Asn Cys Pro Ser Cys Arg Leu Arg Lys Cys Tyr Glu Ala Gly Met
530 535 540

```
Thr Leu Gly Ala Arg Lys Leu Lys Lys Leu Gly Asn Leu Lys Leu Gln
545                 550                 555                 560

Glu Glu Gly Glu Ala Ser Ser Thr Thr Ser Pro Thr Glu Glu Thr Thr
                565                 570                 575

Gln Lys Leu Thr Val Ser His Ile Glu Gly Tyr Glu Cys Gln Pro Ile
            580                 585                 590

Phe Leu Asn Val Leu Glu Ala Ile Glu Pro Gly Val Val Cys Ala Gly
        595                 600                 605

His Asp Asn Asn Gln Pro Asp Ser Phe Ala Ala Leu Leu Ser Ser Leu
    610                 615                 620

Asn Glu Leu Gly Glu Arg Gln Leu Val His Val Val Lys Trp Ala Lys
625                 630                 635                 640

Ala Leu Pro Gly Phe Arg Asn Leu His Val Asp Asp Gln Met Ala Val
                645                 650                 655

Ile Gln Tyr Ser Trp Met Gly Leu Met Val Phe Ala Met Gly Trp Arg
            660                 665                 670

Ser Phe Thr Asn Val Asn Ser Arg Met Leu Tyr Phe Ala Pro Asp Leu
        675                 680                 685

Val Phe Asn Glu Tyr Arg Met His Lys Ser Arg Met Tyr Ser Gln Cys
    690                 695                 700

Val Arg Met Arg His Leu Ser Gln Glu Phe Gly Trp Leu Gln Ile Thr
705                 710                 715                 720

Pro Gln Glu Phe Leu Cys Met Lys Ala Leu Leu Leu Phe Ser Ile Ile
                725                 730                 735
```

```
Pro Val Asp Gly Leu Lys Asn Gln Lys Phe Phe Asp Glu Leu Arg Met
            740                 745                 750

Asn Tyr Ile Lys Glu Leu Asp Arg Ile Ile Ala Cys Lys Arg Lys Asn
        755                 760                 765

Pro Thr Ser Cys Ser Arg Arg Phe Tyr Gln Leu Thr Lys Leu Leu Asp
    770                 775                 780

Ser Val Gln Pro Ile Ala Arg Glu Leu His Gln Phe Thr Phe Asp Leu
785                 790                 795                 800

Leu Ile Lys Ser His Met Val Ser Val Asp Phe Pro Glu Met Met Ala
                805                 810                 815

Glu Ile Ile Ser Val Gln Val Pro Lys Ile Leu Ser Gly Lys Val Lys
            820                 825                 830

Pro Ile Tyr Phe
        835
```